

CLAIMS

What is claimed is:

1 ~~1. A method for providing ringing timeout disconnect supervision in~~
2 ~~remote telephone extensions, the method comprising the steps of:~~
3 ~~providing a time limit for a first ringing voltage signal in response to~~
4 ~~an attempted call, wherein the call is attempted via a voice over packet-data-~~
5 ~~network system (VOPS);~~
6 ~~ceasing generation of the first ringing voltage signal upon expiration of~~
7 ~~the time limit; and~~
8 ~~transmitting a control message to terminate the attempted call,~~
9 ~~wherein the control message is transmitted via the VOPS.~~

1 2. The method of claim 1, further comprising the steps of:
2 placing a telephone call to a first switch system by dialing a number;
3 routing the telephone call to a second switch system;
4 generating a second ringing voltage signal to the second switch system;
5 detecting the second ringing voltage signal;
6 placing the second switch system in an offhook state in response to the
7 detected second ringing voltage signal;
8 creating a temporary logical connection using a wide area packet data
9 network; and
10 ringing a receiving telephone interface of a third switch system.

1 3. The method of claim 2, wherein the temporary logical connection is
2 created when a first VOPS switched call control system (SCCS) of the second

3 ~~switch system establishes a connection with a second VOPS SCCS and the~~
 4 receiving telephone interface of the third switch system using the wide area
 5 packet data network and at least one network interface and at least one
 6 telephone interface.

1 4. The method of claim 2, wherein the first switch system comprises
 2 private branch exchanges and public switched telephone networks (PSTNs).

1 5. The method of claim 2, wherein the second switch system comprises a
 2 private branch exchange interface, a PSTN interface, a VOPS SCCS, and a
 3 packet data network interface, wherein the third switch system comprises at
 4 least one telephone interface, a VOPS SCCS, and a packet data network
 5 interface.

1 6. The method of claim 5, wherein a timer of the VOPS SCCS of the third
 2 switch system controls the time limit.

1 7. The method of claim 3, wherein the step of ceasing generation of the
 2 first ringing voltage signal comprises ceasing generation of the ringing
 3 voltage at the receiving telephone interface, wherein upon expiration of the
 4 time limit the second VOPS SCCS instructs the receiving telephone interface
 5 to cease generation of the ringing voltage, wherein the second VOPS SCCS
 6 transmits a control message to the first VOPS SCCS using the wide area packet
 7 data network, wherein the control message indicates the attempted call is to
 8 be terminated.

1 8. ~~The method of claim 2, further comprising the steps of:~~

2 placing the second switch system in an onhook state in response to the
3 received control message; and
4 releasing a first telephone interface, wherein the first telephone
5 interface is available for additional telephone calls.

1 9. The method of claim 2, wherein the receiving telephone interface is
2 selected by a caller using DTMF digits entered in response to a secondary dial
3 tone generated by the second switch system.

1 10. The method of claim 2, wherein the second switch system is
2 preconfigured to automatically select the receiving telephone interface in
3 response to a received call from a first telephone interface.

1 11. The method of claim 6, wherein the timer comprises configurable
2 timers and fixed timers.

1 12. The method of claim 1, further comprising the step of routing
2 integrated traffic comprising data, voice, video, Local Area Network-based,
3 and facsimile traffic, the step of routing comprising the steps of:

4 receiving at least one data stream, at least one voice channel, and at
5 least one video stream;

6 packetizing the received at least one data stream;

7 multiplexing the packetized at least one data stream, the at least one
8 voice channel, and the at least one video stream into a transport stream; and

9 providing the transport stream to at least one wide area packet data
10 network using a configurable trunk.

1 ~~13. The method of claim 12, wherein the at least one wide area packet data~~
2 ~~network comprises Asynchronous Transfer Mode (ATM), Frame Relay, High-~~
3 ~~level Data Link Control (HDLC), Internet Protocol (IP), and Time Division~~
4 ~~Multiplex (TDM) networks, and leased-line carrier services.~~

1 14. The method of claim 12, wherein the at least one data stream, the at
2 least one voice channel, and the at least one video stream are integrated into
3 the transport stream and transported over at least one network comprising
4 cell-based and packet-based multi-service networks.

1 15. The method of claim 14, wherein the at least one voice channel is split
2 out to an alternate network comprising a Public Switched Telephone
3 Network (PSTN) and a Time Division Multiplexed (TDM) network.

1 16. The method of claim 12, wherein the at least one voice channel is
2 received from at least one private branch exchange, at least one key system,
3 and at least one telephone, wherein the transport stream comprises a
4 plurality of channels of compressed voice.

1 17. The method of claim 12, further comprising the step of configuring the
2 configurable trunk at a physical level and a protocol level using at least one
3 trunk option, wherein configuring comprises using software to configure the
4 trunk among a plurality of service connections comprising T1 and E1, and
5 using software to allocate a plurality of trunk channels and time slots among
6 at least one multi-service network connection.

1 18. The method of claim 17, wherein a first trunk option provides
2 structured trunking comprising time slot mapping, wherein at least one time
3 slot is used for on-net traffic and services, wherein at least one time slot is
4 used for drop/insert pass-through of unprocessed Public Switched Telephone
5 Network (PSTN) traffic.

1 19. The method of claim 17, wherein a second trunk option comprises an
2 ATM trunk option, wherein all channels and time slots of the configurable
3 trunk are used for T1/E1 ATM.

1 20. The method of claim 12, wherein the step of receiving comprises
2 receiving the at least one data stream, the at least one voice channel, and the
3 at least one video stream from at least one port comprising at least one
4 Ethernet port, at least one serial port, at least one digital voice port, and at
5 least one analog voice port.

1 21. The method of claim 12, wherein the at least one voice channel
2 comprises combinations of compressed and Pulse Coded Modulation (PCM)
3 voice.

1 22. An apparatus for providing ringing timeout disconnect supervision in
2 remote telephone extensions, the apparatus comprising at least one processor,
3 wherein the at least one processor is configured to control the apparatus to:
4 provide a time limit for a ringing voltage in response to an attempted
5 call wherein the call is attempted via a voice over packet-data-network
6 system (VOPS);

7 ~~cease generation of the ringing voltage upon expiration of the time~~
8 limit; and

9 transmit a control message to terminate the attempted call, wherein
10 the control message is transmitted via the VOPS.

1 23. The apparatus of claim 22, wherein the at least one processor is further
2 configured to control the apparatus to:

3 place a telephone call from a first telephone interface, wherein a
4 number is dialed causing a call to be routed to a first private branch exchange;

5 generate a ringing voltage signal on a telephone line coupled to a
6 second private branch exchange;

7 detect the ringing voltage signal and answering the call, wherein the
8 second private branch exchange enters an offhook state;

9 create a temporary logical connection using a wide area packet data
10 network, wherein a first VOPS switched call control system (SCCS) coupled to
11 the second private branch exchange establishes a connection with a second
12 VOPS SCCS and a second telephone interface using the wide area packet data
13 network and at least one network interface; and

14 signal receipt of the call at the second telephone interface, wherein a
15 ringing voltage is generated at the second telephone interface.

1 24. The apparatus of claim 23, wherein a timer of the second VOPS SCCS
2 controls the time limit.

25. The apparatus of claim 23, wherein upon expiration of the time limit the second VOPS SCCS instructs the second interface to cease generation of the ringing voltage, wherein the second VOPS SCCS transmits a control

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4 message to the first VOPS SCCS coupled to the second private branch
5 exchange using the wide area packet data network, wherein the control
6 message indicates the attempted call is to be terminated.

1 26. The apparatus of claim 23, wherein the at least one processor is further
2 configured to control the apparatus to
3 place the second private branch exchange in an onhook state in
4 response to the received control message; and
5 release the first telephone interface, wherein the first telephone
6 interface is available for additional telephone calls.

1 27. The method of claim 23, wherein the second telephone interface is
2 selected by a caller using DTMF digits entered in response to a secondary dial
3 tone generated by the second private branch exchange.

1 28. The method of claim 23, wherein the second private branch exchange
2 is preconfigured to automatically select the second telephone interface in
3 response to a received call from the first telephone interface.

1 29. The method of claim 24, wherein the timer comprises configurable
2 timers and fixed timers.

1 30. The apparatus of claim 22, wherein the processor is further configured
2 to control the apparatus to route integrated traffic comprising data, voice,
3 video, Local Area Network-based, and facsimile traffic, wherein the routing
4 comprises:

receiving at least one data stream, at least one voice channel, and at least one video stream;

packetizing the received at least one data stream;

multiplexing the packetized at least one data stream, the at least one voice channel, and the at least one video stream into a transport stream; and

providing the transport stream to at least one wide area packet data network using a configurable trunk.

31. The apparatus of claim 30, wherein the at least one wide area packet data network comprises Asynchronous Transfer Mode (ATM), Frame Relay, High-level Data Link Control (HDLC), Internet Protocol (IP), and Time Division Multiplex (TDM) networks, and leased-line carrier services.

32. The apparatus of claim 30, wherein the at least one data stream, the at least one voice channel, and the at least one video stream are integrated into the transport stream and transported over at least one network comprising cell-based and packet-based multi-service networks.

33. The apparatus of claim 30, further comprising the step of configuring the configurable trunk at a physical level and a protocol level using at least one trunk option, wherein configuring comprises using software to configure the trunk among a plurality of service connections comprising T1 and E1, and using software to allocate a plurality of trunk channels and time slots among at least one multi-service network connection.

34. The apparatus of claim 33, wherein a first trunk option provides structured trunking comprising time slot mapping, wherein at least one time

3 ~~slot is used for on-net traffic and services, wherein at least one time slot is~~
4 ~~used for drop/insert pass-through of unprocessed Public Switched Telephone~~
5 ~~Network (PSTN) traffic, wherein a second trunk option comprises an ATM~~
6 ~~trunk option, wherein all channels and time slots of the configurable trunk~~
7 ~~are used for T1/E1 ATM.~~

1 35. A computer readable medium containing executable instructions
2 which, when executed in a processing system, causes the system to perform
3 the steps of a method for providing ringing timeout disconnect supervision
4 in remote telephone extensions, the method comprising the steps of:
5 providing a time limit for a first ringing voltage signal in response to
6 an attempted call, wherein the call is attempted via a voice over packet-data-
7 network system (VOPS);
8 ceasing generation of the first ringing voltage signal upon expiration of
9 the time limit; and
10 transmitting a control message to terminate the attempted call,
11 wherein the control message is transmitted via the VOPS.

1 36. The computer readable medium of claim 35, wherein the method
2 further comprises the steps of:
3 placing a telephone call to a first switch system by dialing a number;
4 routing the telephone call to a second switch system;
5 generating a second ringing voltage signal to the second switch system;
6 detecting the second ringing voltage signal;
7 placing the second switch system in an offhook state in response to the
8 ~~detected second ringing voltage signal,~~

9 ~~creating a temporary logical connection using a wide area packet data~~
 10 network; and
 11 ringing a receiving telephone interface of a third switch system.

1 37. The computer readable medium of claim 36, wherein the temporary
 2 logical connection is created when a first VOPS switched call control system
 3 (SCCS) of the second switch system establishes a connection with a second
 4 VOPS SCCS and the receiving telephone interface of the third switch system
 5 using the wide area packet data network and at least one network interface
 6 and at least one telephone interface.

1 38. The computer readable medium of claim 36, wherein the first switch
 2 system comprises private branch exchanges and public switched telephone
 3 networks (PSTNs), wherein the second switch system comprises a private
 4 branch exchange interface, a PSTN interface, a VOPS SCCS, and a packet data
 5 network interface, wherein the third switch system comprises at least one
 6 telephone interface, a VOPS SCCS, and a packet data network interface.

1 39. The computer readable medium of claim 38, wherein a timer of the
 2 VOPS SCCS of the third switch system controls the time limit, wherein the
 3 timer comprises configurable timers and fixed timers.

1 40. The computer readable medium of claim 37, wherein the step of
 2 ceasing generation of the first ringing voltage signal comprises ceasing
 3 generation of the ringing voltage at the receiving telephone interface,
 4 wherein upon expiration of the time limit the second VOPS SCCS instructs
 5 ~~the receiving telephone interface to cease generation of the ringing voltage,~~

6 ~~wherein the second VOPS SCCS transmits a control message to the first VOPS~~
 7 SCCS using the wide area packet data network, wherein the control message
 8 indicates the attempted call is to be terminated.

1 41. The computer readable medium of claim 36, wherein the receiving
 2 telephone interface is selected by a caller using DTMF digits entered in
 3 response to a secondary dial tone generated by the second switch system.

1 42. The computer readable medium of claim 36, wherein the second
 2 switch system is preconfigured to automatically select the receiving telephone
 3 interface in response to a received call from a first telephone interface.

1 43. The computer readable medium of claim 30, wherein the method
 2 further comprises the step of routing integrated traffic comprising data, voice,
 3 video, Local Area Network-based, and facsimile traffic, the step of routing
 4 comprising the steps of:

5 receiving at least one data stream, at least one voice channel, and at
 6 least one video stream;

7 packetizing the received at least one data stream;

8 multiplexing the packetized at least one data stream, the at least one
 9 voice channel, and the at least one video stream into a transport stream; and

10 providing the transport stream to at least one wide area packet data
 11 network using a configurable trunk.

1 44. The computer readable medium of claim 43, wherein the at least one
 2 wide area packet data network comprises Asynchronous Transfer Mode
 3 ~~(ATM), Frame Relay, High-level Data Link Control (HDLC), Internet Protocol~~

4 (IP), and Time Division Multiplex (TDM) networks, and leased-line carrier
5 services.

1 45. The computer readable medium of claim 43, wherein the at least one
2 data stream, the at least one voice channel, and the at least one video stream
3 are integrated into the transport stream and transported over at least one
4 network comprising cell-based and packet-based multi-service networks.

1 46. The computer readable medium of claim 45, wherein the at least one
2 voice channel is split out to an alternate network comprising a Public
3 Switched Telephone Network (PSTN) and a Time Division Multiplexed
4 (TDM) network.

1 47. The computer readable medium of claim 43, wherein the at least one
2 voice channel is received from at least one private branch exchange, at least
3 one key system, and at least one telephone, wherein the transport stream
4 comprises a plurality of channels of compressed voice.

1 48. The computer readable medium of claim 43, wherein the method
2 further comprises the step of configuring the configurable trunk at a physical
3 level and a protocol level using at least one trunk option, wherein
4 configuring comprises using software to configure the trunk among a
5 plurality of service connections comprising T1 and E1, and using software to
6 allocate a plurality of trunk channels and time slots among at least one multi-
7 service network connection.

1 ~~49. The computer readable medium of claim 48, wherein a first trunk~~
2 ~~option provides structured trunking comprising time slot mapping, wherein~~
3 ~~at least one time slot is used for on-net traffic and services, wherein at least~~
4 ~~one time slot is used for drop/insert pass-through of unprocessed Public~~
5 ~~Switched Telephone Network (PSTN) traffic, wherein a second trunk option~~
6 ~~comprises an ATM trunk option, wherein all channels and time slots of the~~
7 ~~configurable trunk are used for T1/E1 ATM.~~

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